

CLAIMS

1. A method of measuring a three-dimensional surface shape of a workpiece (W) by moving a three-dimensional measuring unit (12) mounted on a robot (14) to trace a surface of said workpiece (W), comprising:

the first step of setting and recording block data (120) representing a measuring operation to cause said three-dimensional measuring unit (12) to trace a predetermined area;

the second step of setting a length (U) and/or a height (h) of said workpiece (W);

the third step of selecting one of a plurality of basic shape types which is similar to a shape of said workpiece (W);

the fourth step of duplicating said block data (120) such that a hypothetical block representing said block data (120) covers an area to be measured of the surface of said workpiece (W) which is projected onto a hypothetical space, depending on the selected basic shape type and the length (U) and/or the height (h) of said workpiece (W); and

the fifth step of measuring the surface shape of said workpiece (W) based on the duplicated block data (120).

2. A method according to claim 1, wherein said three-dimensional measuring unit (12) includes a displacement gage (20) for measuring a distance up to said workpiece (W), and

said robot (14) is operated based on the distance measured by said displacement gage (20) to move said three-dimensional measuring unit (12) toward or away from said workpiece (W) to keep said three-dimensional measuring unit (12) in a measurable range from said workpiece (W) while the measuring operation is performed.

3. A method according to claim 1, wherein said block data (120) comprises data representing a motion pattern for reciprocally moving said three-dimensional measuring unit (12) while displacing said three-dimensional measuring unit (12) horizontally by a detection width (D).

4. A method according to claim 1, wherein in said fourth step, said block data (120) is deformed and duplicated.

5. A method according to claim 1, wherein in said fifth step, after said surface shape is measured based on predetermined block data (120) and when said surface shape is measured based on next block data (120), a base (30) of said robot (14) is moved in positional alignment with the next block data (120).

6. A method according to claim 5, wherein said base (30) is placed on a movable carriage (22), and said base (30) is moved when said movable carriage (22) is moved.

7. A method of measuring a three-dimensional surface shape of a workpiece (W) by moving a three-dimensional measuring unit (12) mounted on a robot (14) to trace a surface of the workpiece (W), comprising:

the step of setting a basic path for moving said three-dimensional measuring unit (12) a predetermined distance; and

the step of duplicating said basic path a plurality of times at predetermined intervals to set block data (120) representing a measuring operation to cause said three-dimensional measuring unit (12) to trace the surface shape of said workpiece (W).

8. An apparatus for measuring a three-dimensional surface shape of a workpiece (W) by moving a three-dimensional measuring unit (12) mounted on a robot (14) to trace a surface of said workpiece (W), comprising:

a block data setting recorder (100) for setting and recording block data (120) representing a measuring operation to cause said three-dimensional measuring unit (12) to trace a predetermined area;

a data input unit (66) for setting a length (U) and/or a height (h) of said workpiece (W);

a basic shape selector (102) for selecting one of a plurality of basic shape types which is similar to a shape of said workpiece (W);

a block data duplicator (104) for duplicating said block data (120) such that a hypothetical block representing said block data (120) covers an area to be measured of the surface of said workpiece (W) which is projected onto a hypothetical space, depending on the selected basic shape type and the length (U) and/or the height (h) of said workpiece (W); and

a measurement performing unit (106) for measuring the surface shape of said workpiece (W) based on the duplicated block data (120).

9. An apparatus according to claim 8, wherein said three-dimensional measuring unit (12) includes a displacement gage (20) for measuring a distance up to said workpiece (W), and said robot (14) is operated based on the distance measured by said displacement gage (20) to move said three-dimensional measuring unit (12) toward or away from said workpiece (W) to keep said three-dimensional measuring unit (12) in a measurable range from said workpiece (W) while the measuring operation is performed.

10. An apparatus according to claim 8, wherein said block data (120) comprises data representing a motion pattern for reciprocally moving said three-dimensional measuring unit (12) while displacing said three-dimensional measuring unit (12) horizontally by a detection width (D).

11. An apparatus according to claim 8, wherein said block data duplicator duplicates said block data (120) while deforming said block data (120).

5           12. An apparatus according to claim 8, wherein after said measurement performing unit measures said surface shape based on predetermined block data (120) and when said measurement performing unit measures said surface shape based on next block data (120), a base (30) of said robot  
10           (14) is moved in positional alignment with the next block data (120).

13. An apparatus according to claim 12, wherein said base (30) is placed on a movable carriage (22), and said  
15           base (30) is moved when said movable carriage (22) is moved.